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(54) INK JET RECORDING PAPER AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To increase ink absorbing capacity without unnecessarily increasing a film thickness while holding a high ink absorbing speed by successively providing a void free ink absorbing layer containing a film hardening hydrophilic binder and a void-containing ink absorbing layer containing inorg. fine particles having a specific particle size and a hydrophilic binder on a support.

SOLUTION: A void free first ink absorbing layer containing a hydrophilic binder is provided on the side near to a support and a second ink absorbing layer having a void structure is provided on the first ink absorbing layer. The first ink absorbing layer is formed so that the hydrophilic binder is hardened in a film form so as to be swollen freely by the absorption of ink. The second ink absorbing layer contains inorg. fine particles with an average particle size of 100 nm or more and the hydrophilic binder. When the average particle size of the inorg. fine particles exceeds 100 nm, a sharp image is hard to obtain. Void capacity is set to 10-30 ml per 1m² of recording paper. Ink absorbing capacity is increased without unnecessarily increasing film thickness while holding a high ink absorbing speed.

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CLAIMS

[Claim(s)]

[Claim 1] The ink jet record form characterized by preparing the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening layer in which a mean diameter contains a non-subtlety particle and a hydrophilic binder 100nm or less on a base material at this order.

[Claim 2] The ink jet record form according to claim 1 characterized by 30 - 100% of the weight of the hydrophilic binder used for said 1st ink absorption layer being gelatin.

[Claim 3] The ink jet record form according to claim 1 or 2 characterized by said 1st amount of hydrophilic binders being per [0.5-5g] two 1m of record forms.

[Claim 4] An ink jet record form given in any 1 term of claims 1-3 characterized by said 2nd ink absorption layer containing an oil droplet.

[Claim 5] An ink jet record form given in any 1 term of claims 1-4 characterized by said 2nd ink absorption layer containing a cationic polymer mordant at least.

[Claim 6] An ink jet record form given in any 1 term of claims 1-4 characterized by said 1st ink absorption layer and the 2nd ink absorption layer containing a cationic non-polymer mordant.

[Claim 7] On a base material In the manufacture approach of an ink jet record form of coming to prepare the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening layer in which a mean diameter contains a non-subtlety particle and a hydrophilic binder 100nm or less in this order After carrying out spreading desiccation of the coating liquid containing the hardening agent which forms the 1st ink absorption layer on a base material, The manufacture approach of the ink jet record form characterized by being what obtained by carrying out spreading desiccation of the coating liquid which forms the ink absorption layer which has the 2nd opening layer after making whenever [dura mater / of the 1st ink absorption layer] or less into five on the 1st ink absorption layer.

[Claim 8] On a base material In the manufacture approach of an ink jet record form of coming to prepare the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening layer in which a mean diameter contains a non-subtlety particle and a hydrophilic binder 100nm or less in this order The manufacture approach of the ink jet record form characterized by applying at coincidence

the coating liquid which forms the 1st ink absorption layer, and the coating liquid which forms the 2nd ink absorption layer which has the 2nd opening layer on a base material.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to high ink rate of absorption, the ink jet record form which has high ink absorption capacity, and its manufacture approach especially about the ink jet record form which records using water color ink, and its manufacture approach.

[0002]

[Description of the Prior Art] although ink jet record makes the minute drop of ink fly by various working principles, and is made to adhere to record sheets, such as paper, and an image, an alphabetic character, etc. are recorded, a high speed, the low noise, and multiple-color-izing are comparatively easy -- etc. -- it has the advantage. About the blinding of a nozzle and the maintenance which had become a problem from the former by this method, from both sides of ink and equipment, amelioration progresses and it has spread through various fields, such as various printers, facsimile, and a computer terminal, quickly in current.

[0003] As an ink jet record form (only henceforth a record form) used by this ink jet recording method, also when a printing dot laps [that a color tone is brightly skillful and absorption of ink] early, the diffusion to the longitudinal direction of ink flowing out or not spreading and a printing dot is not large [the concentration of a printing dot is high, and] beyond the need, and it is required that the circumference should be smooth and should not fade etc.

[0004] Since it becomes nonuniformity, and the color of each other in the border area of a color which a drop causes a HAJIKI phenomenon on a record form, and is different spreads and it is easy to reduce image quality greatly in case the liquid ink drop of two or more colors laps and is recorded, when especially ink rate of absorption is slow, it is required to give ink absorptivity high as a record form. In order to solve these problems, very many techniques are proposed from the former.

[0005] For example, the record form which carried out humidity of the coating for surface treatment to the low size stencil paper indicated by JP,52-53012,A, The record form which prepared the coated layer of ink absorptivity in the support surface indicated by JP,55-5830,A, The record form which contains non-colloid silica powder as a pigment in the covered layer indicated by JP,56-157,A, The record form which used together the inorganic pigment indicated by JP,57-107878,A and the organic pigment, The record form which has two hole distribution peaks indicated by JP,58-110287,A, The record form which consists of a vertical two-layer porous layer indicated by JP,62-111782,A, The record form which has the indeterminate form crack indicated by JP,59-68292,A, 59-123696, the 60-18383 official report, etc., The record form which has the impalpable powder layer indicated by JP,61-135786,A, 61-148092, the 62-149475 official report, etc., JP,63-252779,A, JP,1-108083,A, 2-136279, The record form containing the pigment which has the specific physical-properties value indicated by 3-65376, 3-27976, etc., or a particle silica, JP,57-14091,A, 60-219083, 60-210984, 61-20797, 61-188183, JP,5-

278324,A, 6-92011, 6-183134, 7-137431, The record form containing particle silicas, such as a colloid silica indicated by 7-276789 etc., And JP,2-276671,A, a 3-67684 official report, 3-215082, A large number are known for the record form containing the hydrated alumina particle indicated by 3-251488, 4-67986, 4-263983, the 5-16517 official report, etc.

[0006] When absorptivity is in the base material itself also in the above, it has a high absorption capacity and ink absorptivity, and is desirable from a viewpoint of absorption of ink, but in order for the base material itself to absorb an ink solvent, after an ink solvent dries after record, there is a problem which a base material produces in the shape of flapping, and **** Siwa tends to produce in the shape of an image.

[0007] On the other hand, when a base material is non-absorptivity, while such a problem cannot be found and an image with clear high concentration is obtained, the void volume of the ink absorption layer prepared on the base material receives a limit.

[0008] For example, in the coat whose desiccation thickness is 40 micrometers, when solid content assumes the coat which is 22 micrometers temporarily as uniform volume, the amount of openings will not have only =18 ml/m² per two (40-22) 1m of ink jet record forms, and although based also on a recording method, the case where ink absorption capacity may be insufficient near the amount of the maximum ink may produce it. When ink absorption capacity runs short, ink overflows, and image quality is degraded sharply.

[0009] Although it is necessary to make desiccation thickness sufficiently thick in order to absorb enough a lot of [since there are few ink absorbed amounts in the ink absorption layer which has opening structure than the desiccation capacity of a coat from the first] ink, the brittleness (adhesive property [especially as opposed to the crack or base material under damp]) of a coat tends to fall in this case.

[0010] On the other hand, the ink jet record form which receives ink with the bloating tendency of a hydrophilic binder is also known. Although the ink rate of absorption of such an ink jet record form is slow compared with the record form which has opening structure, the absorption capacity of ink can have ink absorption capacity only with a part comparatively high for a certain reason for a hydrophilic binder to swell.

[0011] For this reason, although high ink rate of absorption and high ink absorption capacity are attained by making it an ink absorption layer combining the ink absorption layer which has the ink absorption layer and opening layer of a swelling mold, it is guessed easily.

[0012] Although it found out that ink absorption capacity could be increased, without reducing ink rate of absorption by this invention persons preparing the layer which has opening structure in the maximum upper layer which absorbs ink as a result of inquiring per this point, and preparing a swelling layer in the side near a base material, it became clear that a crack arose at the time of manufacture.

[0013] This crack paints the hydrophilic binder on the lower layer as a swelling layer beforehand, and when the ink absorption layer which has opening structure is prepared on this, it produces it.

[0014]

[Problem(s) to be Solved by the Invention] The 1st technical problem which this invention is made in view of the above-mentioned actual condition, and this invention tends to solve is to crocodile and offer [have the ink absorption layer which increased ink

absorption capacity on a base material, without increasing thickness unnecessarily, with high ink rate of absorption held,] few ink jet record forms.

[0015] Moreover, the 2nd technical problem which this invention tends to solve is to offer the ink jet record form which has a high water resisting property and high moisture resistance, and has high ink rate of absorption and high ink absorption capacity.

[0016] The 3rd technical problem which this invention furthermore tends to solve is to offer the manufacture approach of the above-mentioned record form.

[0017]

[Means for Solving the Problem] The above-mentioned technical problem of this invention is attained by the following configurations.

[0018] 1. Ink jet record form characterized by preparing the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have opening substantially, and the 2nd ink absorption layer which has opening layer in which mean diameter contains non-subtlety particle and hydrophilic binder 100nm or less on base material at this order.

[0019] 2. Ink jet record form given in said 1 characterized by 30 - 100% of the weight of hydrophilic binder used for said 1st ink absorption layer being gelatin.

[0020] 3. Ink jet record form given in said 1 or 2 characterized by said 1st amount of hydrophilic binders being per [0.5-5g] two 1m of record forms.

[0021] 4. Ink jet record form given in said any 1 term of 1-3 characterized by said 2nd ink absorption layer containing oil droplet.

[0022] 5. Ink jet record form given in said any 1 term of 1-4 characterized by said 2nd ink absorption layer containing cationic polymer mordant at least.

[0023] 6. Ink jet record form given in said any 1 term of 1-4 characterized by said 1st ink absorption layer and the 2nd ink absorption layer containing cationic non-polymer mordant.

[0024] 7. On Base Material In the manufacture approach of an ink jet record form of coming to prepare the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening layer in which a mean diameter contains a non-subtlety particle and a hydrophilic binder 100nm or less in this order After carrying out spreading desiccation of the coating liquid containing the hardening agent which forms the 1st ink absorption layer on a base material, The manufacture approach of the ink jet record form characterized by being what obtained by carrying out spreading desiccation of the coating liquid which forms the ink absorption layer which has the 2nd opening layer after making whenever [dura mater / of the 1st ink absorption layer] or less into five on the 1st ink absorption layer.

[0025] 8. On Base Material In the manufacture approach of an ink jet record form of coming to prepare the 1st [containing the hydrophilic binder by which the dura mater was carried out] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening layer in which a mean diameter contains a non-subtlety particle and a hydrophilic binder 100nm or less in this order The manufacture approach of the ink jet record form characterized by applying at coincidence the coating liquid which forms the 1st ink absorption layer, and the coating liquid which forms the 2nd ink absorption layer which has the 2nd opening layer on a base material.

[0026] Hereafter, this invention is explained to a detail.

[0027] As a base material used for the ink jet record form of this invention, a thing well-known as a record form for ink jets can be used suitably conventionally.

[0028] The thing of a property which bears the radiant heat when being able to mention the film which consists of ingredients, such as polyester system resin, diacetate system resin, thoria TESETO system resin, acrylic resin, polycarbonate system resin, polyvinyl chloride system resin, polyimide system resin, cellophane, and celluloid, a plate, a glass plate, etc. as a transparence base material, for example, and being used as an OHP also in this is desirable, and especially polyethylene terephthalate is desirable. As thickness of such a transparent base material, about 10-200 micrometers is desirable. It is desirable from an adhesive viewpoint of an ink absorbing layer, a back layer, and a base material to prepare a well-known under-coating layer in an ink absorbing layer [of a transparence base material] and back layer side.

[0029] Moreover, what carried out opacification processing of the sheet which consists of common paper, a synthetic paper, resin covering paper, cloth, wood, a metal, etc. as a base material used when there is no transparent need, for example, a plate, and the above-mentioned translucency base material with the well-known means can be mentioned. The so-called White pet which comes to add white pigments to the resin covering paper (the so-called RC paper) which has the polyolefin resin enveloping layer which added white pigments etc. at least to one side of a base paper as an opaque base material, and polyethylene terephthalate is desirable.

[0030] It is desirable to perform corona discharge treatment, undercoating processing, etc. to a base material in advance of spreading of an ink absorbing layer for the purpose, such as to enlarge bond strength of the above-mentioned base material and an ink television layer. Furthermore, the record form of this invention does not necessarily need to be colorlessness, and may be a colored record form.

[0031] In photograph image quality, near and especially since the image of high quality is moreover obtained by low cost, as for a record image, it is desirable to use the paper base material which laminated both sides of a paper base material with polyethylene in the ink jet record form of this invention. The paper base material laminated with such polyethylene is explained below.

[0032] The stencil paper used for a paper base material uses wood pulp as the main raw material, and, in addition to wood pulp, paper making is carried out using synthetic fibers, such as synthetic pulps, such as polypropylene, or nylon, and polyester, if needed. Although both LBKP, LBSP, NBKP, NBSP LDP and NDP LUKP and NUKP can be used as wood pulp, it is desirable to use more many [for a staple fiber] LBKP, NBSP(s), LBSP(s), and NDP(s) and LDP(s). However, it reaches LBSP or the ratio of LDP has 10 % of the weight or more and 70 desirable % of the weight or less.

[0033] The pulp of the above-mentioned pulp which chemical pulp with few impurities (sulfate pulp and sulfite pulp) was used preferably, and performed bleaching processing, and raised the whiteness degree is also useful.

[0034] Hara Kaminaka can add suitably flexible-sized agents, such as moisture hold-back agents, such as paper reinforcing agents, such as white pigments, such as sizing compounds, such as a higher fatty acid and an alkyl ketene dimer, a calcium carbonate, talc, and titanium oxide, starch, polyacrylamide, and polyvinyl alcohol, a fluorescent brightener, and polyethylene glycols, a dispersant, and the 4th class ammonium, etc.

[0035] The freshness of the pulp used for paper making has desirable 200-500 cc by

convention of CSF, and 30 thru/or 70% have the desirable sum of 24-mesh residue weight % and weight % for 42-mesh ** as which the fiber length after beating is specified to JIS-P -8207. In addition, as for weight % of the four-mesh residue, it is desirable that it is 20 or less % of the weight.

[0036] The basis weight of stencil paper has 30 thru/or desirable 250g, and 50 thru/or especially its 200g are desirable. The thickness of stencil paper has 40 thru/or desirable 250 micrometers.

[0037] After a paper-making phase or paper making, calender processing of the stencil paper can be carried out, and it can also give the Takahira slippage. A stencil paper consistency has 0.7 thru/or common 1.2 g/m² (JIS-P -8118). Furthermore, stencil paper stiffness has 20 thru/or desirable 200g on the conditions specified to JIS-P -8143.

[0038] A surface sizing compound may be applied to a stencil paper front face, and the sizing compound same as a surface sizing compound as said size which can carry out the Hara Kaminaka addition can be used.

[0039] When pH of stencil paper is looked like [the hot water extraction method specified by JIS-P-8113] and it is measured more, mainly although the polyethylene with which that it is 5-9 cover a desirable stencil paper front face and a desirable rear face is the polyethylene (LDPE) of a low consistency, and/or polyethylene (HDPE) of high density, a part of other LLDPE(s), polypropylene, etc. can be used for it.

[0040] As for especially the polyethylene layer by the side of an ink absorbing layer, what added the titanium oxide of a rutile or an anatase mold in polyethylene as widely performed by the printing paper for photographs, and improved opacity and a whiteness degree is desirable. A titanium oxide content is 4 - 13 % of the weight preferably three to 20% of the weight in general to polyethylene.

[0041] polyethylene covering paper can also use the object in which a mat side which performs the so-called mold attachment processing and is acquired with the usual photographic printing paper, and the silky surface were formed, by this invention, in case melting push appearance also of also using as glossy paper is carried out and it coats polyethylene on a stencil paper front face.

[0042] After preparing an ink absorbing layer and a back layer, the amount of the polyethylene used of the front flesh side of stencil paper is damp and range whose 20-40-micrometer and back layer side the polyethylene layer by the side of an ink absorbing layer is 10-30 micrometers in general, although it is chosen so that the curl by highly-humid-izing may be optimized.

[0043] Furthermore, as for the above-mentioned polyethylene covering paper base material, it is desirable to have the following properties.

[0044] A lengthwise direction by the reinforcement specified by :JIS-P -8113 in hauling strength ** 2 thru/or 30kg, A lengthwise direction ** tear reinforcement with desirable longitudinal directions being 1 thru/or 20kg by the convention approach by JIS-P -8116 10 thru/or 200g, ** surface Beck smoothness with a desirable Kg/cm [20 thru/or ** compressibility ≥ 103 Kg/cm² with desirable 200g] longitudinal direction : on the conditions specified to JIS-P -8119, although 20 seconds or more are desirable as a glossy surface The permeability in the beam of light of a visible region by the Measuring condition of straight-line light incidence / diffused-light transparency conditions ** opacity which may be less than [this] in the so-called mold attachment article : 20% or less, ** glossiness especially with 15 desirable% or less: The moisture which ** stencil

paper with desirable 75 degree specular gloss $\geq 30\%$ contains has 5 - 10 desirable % of the weight.

[0045] The record form of this invention consists of the 1st [containing the hydrophilic binder prepared in the side near a base material] ink absorption layer which does not have an opening substantially, and the 2nd ink absorption layer which has the opening structure established on this.

[0046] Although the 1st ink absorption layer is a layer which absorbs and swells ink, in being the layer which this layer swells without any restriction, small Siwa approaches the image section at the time of ink jet record, or it is easy to produce a crack. For this reason, the dura mater of the hydrophilic binder needs to be carried out in the ink jet record form of this invention.

[0047] As a hydrophilic binder used for the 1st ink absorption layer For example, gelatin or a gelatin derivative, a polyvinyl pyrrolidone (about 200,000 or more have desirable average molecular weight), A pullulan, polyvinyl alcohol, or its derivative (about 20,000 or more have desirable average molecular weight), A polyethylene glycol (100,000 or more have a desirable mean molecular weight), a carboxymethyl cellulose, Hydroxyethyl cellulose, a dextran, a dextrin, polyacrylic acid, and its salt, An agar, a kappa carrageenan, lambda-carrageenan, iota-carrageenan, xanthene gum, A polyalkylene oxide system copolymeric polymer given in locust bean gum, an alginic acid, gum arabic, a pullulan, JP,7-195826,A, and 7-9757, Polymers, such as independent or a copolymer which repeats and has these vinyl monomers of the vinyl monomer which has the carboxyl group and sulfonic group of a publication, can be mentioned to a water-soluble polyvinyl butyral or JP,62-245260,A. These hydrophilic binders may be used independently and may use two or more sorts together.

[0048] A desirable hydrophilic binder is gelatin or its derivative.

[0049] Both acid-treatment gelatin and alkali treatment gelatin can use gelatin.

[0050] A gelatin derivative processes gelatin by isocyanates, such as acid anhydrides, such as phthalic anhydride, and phenyl isocyanate, and the gelatin derivative which blocks the amino group of gelatin and is obtained is used preferably.

[0051] When using the cationic mordant mentioned especially later, also in gelatin and a gelatin derivative, it is desirable to use acid-treatment gelatin and six or more acid-treatment gelatin is preferably used especially for the isoelectric point.

[0052] The ratio of the above-mentioned gelatin and the gelatin derivative to the hydrophilic binder which the 1st ink absorption layer contains has 30 - 100 desirable % of the weight, and it is desirable to use 50 to 100% of the weight especially.

[0053] As for the amount of the hydrophilic binder which the 1st ink absorption layer contains, it is desirable that they are per [0.5-5g] two 1m of ink jet record forms, and when it is less than 0.5g, the effectiveness of making the ink absorption capacity which is the effectiveness of this invention increasing becomes small.

[0054] Moreover, in exceeding 5g, it becomes easy to generate Siwa and a crack into a printing part.

[0055] The hydrophilic binder which reacts with a hardening agent and can construct a bridge is used for the 1st ink absorption layer. Although such a hydrophilic binder changes according to the class of hardening agent, it is desirable 30% of the weight or more of the total amount of the hydrophilic binder which the 1st ink absorption layer contains of that they are a hardening agent and the hydrophilic binder which can

construct a bridge.

[0056] A hydrophilic binder, and the hydroxyl group which a hydrophilic binder has as a hardening agent which can react, the amino group, etc. and the compound which can react are used. As such a hardening agent, the organic hardening agent which has inorganic compounds, such as a chromium compound, an aluminium compound, and a boric acid, an epoxy group, an ethylene imino group, a vinyl sulfone radical, an acryloyl radical, a formyl group, etc. is used.

[0057] In containing a below-mentioned cationic polymer mordant or a below-mentioned cationic non-polymer mordant, in order not to reduce the mordanting capacity of condensation prevention with a mordant, or a mordant, it is desirable to use an inorganic hardening agent, the Nonion nature, or a cationic organic hardening agent.

[0058] Although the amount of the above-mentioned hardening agent used changes with classes of a hydrophilic binder or hardening agent, 1-200mg is usually 5-100mg preferably to hydrophilic polymer 1g which can generally construct a bridge.

[0059] Although the standard of the addition of a hardening agent is generally the above-mentioned amount, when whenever [dura mater / of the 1st layer] measures by the approach searched for according to the following, it is desirable that it is decided that it usually becomes the range of 0.5-5.

[0060] That is, spreading desiccation only of the 1st layer is carried out on a non-absorptivity base material, and the value which broke by weight of the hydrophilic binder of a coat the water absorption weight when the sample which carried out the dura mater being immersed for 1 minute into 30-degree C pure water is called whenever [dura mater].

[0061] Although whenever [dura mater] is five or less, to the case of less than 0.5, the enhancement effect of an ink absorbed amount is small, and in exceeding 5, it becomes easy to generate Siwa and a crack at the time of ink jet record. Whenever [desirable dura mater] are 0.7-3.

[0062] The 1st ink absorption layer needs not to have the opening substantially.

[0063] Saying that it does not have the opening substantially here says by this invention that the void volume which the 1st layer to the maximum coefficient of water absorption of the 1st ink absorption layer by which the dura mater is carried out has is 20% or less.

[0064] Although an opening may specifically be formed in the 1st ink absorption layer by adding non-subtlety particles, such as a particle silica condensed the 2nd order, since it is blocked by swelling operation of a hydrophilic binder when such void volume is small, the ink rate of absorption which is an original opening is hardly affected.

[0065] Since the thickness of the whole record form will increase if the void volume of the 1st ink absorption layer increases, the brittleness of the coat accompanying this comes to fall.

[0066] That to which the 1st ink absorption layer carried out the laminating of the two or more hydrophilic binder content layers from which the presentation of a hydrophilic binder and the class of additive differ is also contained. In this case, the amount of whenever [dura mater], or a hydrophilic binder is set up about the hydrophilic whole binder layer of these plurality.

[0067] Next, the 2nd ink absorption layer prepared on the 1st ink absorptivity layer is explained.

[0068] As for the 2nd ink absorption layer, a mean diameter contains a non-subtlety

particle and a hydrophilic binder 100nm or less.

[0069] The breadth of a dot unnecessary in the glossiness of a record form falling, when mean particle diameter uses the non-subtlety particle exceeding 100nm, or the roundness of the dot at the time of ink jet record falling arises, or the fall of the maximum density by the scattered reflection in a front face arises, and it is hard coming to obtain a clear image.

[0070] The minimum of a non-subtlety particle is 10nm or more in general from the handling nature, stability at the time of manufacture, etc., although there is especially no constraint.

[0071] As an example of a non-subtlety particle, white inorganic pigments, such as precipitated calcium carbonate, whiting, a magnesium carbonate, a kaolin, clay, talc, a calcium sulfate, a barium sulfate, a titanium dioxide, a zinc oxide, zinc hydroxide, zinc sulfide, zinc carbonate, a hydrotalcite, aluminum silicate, the diatom earth, a calcium silicate, a magnesium silicate, synthetic amorphous silica, colloidal silica, an alumina, a colloidal alumina, pseudo-boehmite, an aluminum hydroxide, a lithopone, a zeolite, and a magnesium hydroxide, etc. can be mentioned, for example.

[0072] Such a non-subtlety particle may be added in the condition of being used into a binder after homogeneity has distributed having also formed secondary floc with the primary particle, and having distributed in the binder.

[0073] When used in the form where the above-mentioned inorganic particle formed the secondary floc of a primary particle, it is desirable from an glossy viewpoint that the particle size of the primary particle uses a thing 30nm or less.

[0074] Especially although especially the minimum of the particle size of a primary particle is not limited, 6nm or more is usually desirable [a minimum] 3nm or more from a viewpoint on manufacture of a particle.

[0075] In the above, the mean particle diameter of a non-subtlety particle observes the cross section and front face of the particle itself or an opening layer with an electron microscope, and is called for as the arithmetic average value (individual number average) in quest of the particle size of the particle of 100 arbitration. The particle size of each [here] is expressed with the diameter when assuming a circle equal to the projected area.

[0076] Although it is desirable to use the solid-state particle chosen from the particle silica and colloidal silica which were compounded by the gaseous-phase method as a non-subtlety particle, the silica compounded by the gaseous-phase method is the most desirable than the point of high concentration being attained in this invention, and a clear image being recorded, and being able to manufacture by low cost.

[0077] As for the particle silica compounded by the gaseous-phase method, it is desirable that it is the silica powder whose primary particle diameter from which hydrogen and oxygen are obtained by burning at an elevated temperature in a silicon tetrachloride is 5-500nm, and what has the primary particle diameter of 50nm or less especially in this invention is usually more desirable in respect of glossiness.

[0078] As that by which current marketing is carried out as such a gaseous-phase method silica, various kinds of Aerosil of Japanese Aerosil corresponds.

[0079] The colloidal silica preferably used by this invention It is what is obtained by carrying out heating aging of the silica sol which is made to pass the double decomposition and the ion-exchange-resin layer by an acid etc. of a specific silicate, and is obtained. Using this colloidal silica for an ink jet record form for example, JP,57-

14091,A and 60-219083 -- said -- 60-219084 and 61-20792 -- 61-188183, 63-17807, this Taira No. 93284 [four to], It is indicated by 5-278324, 6-92011, 6-183134, 6-297830, 7-81214, 7-101142, 7-179029, 7-137431, International Patent Publication WO 94/No. 26530, etc.

[0080] Especially although the desirable particle diameter of colloidal silica is usually 5-100nm, its particle diameter which is 7-50nm is desirable.

[0081] The silica and colloidal silica which were compounded by the above-mentioned gaseous-phase method may be the object which cation conversion could be carried out in the front face, and was processed by aluminum, calcium, Mg, Ba, etc.

[0082] Although the hydrophilic binder used in the 1st ink absorption layer and the same hydrophilic binder are preferably used for the hydrophilic binder used for the 2nd ink absorption layer, especially polyvinyl alcohol is desirable.

[0083] Each denaturation polyvinyl alcohol of cation denaturation, the Nonion denaturation, and anion denaturation is also contained in this polyvinyl alcohol.

[0084] The thing of 1000-5000 is preferably used from a viewpoint of film formation nature, and 2000 or more things have [the average degree of polymerization of polyvinyl alcohol] especially desirable average molecular weight.

[0085] Whenever [saponification / of polyvinyl alcohol] has 70 - 100% of desirable thing, and 80 - 100% of especially its thing is desirable.

[0086] It is polyvinyl alcohol which has the 1-3rd class amino group which is indicated by JP,61-10483,A, for example, and the 4th class ammonium in the principal chain of the above-mentioned polyvinyl alcohol, or a side chain as cation conversion polyvinyl alcohol, and is obtained by saponifying the copolymer of the ethylenic unsaturated monomer and vinyl acetate which have a cationic radical.

[0087] As an ethylenic unsaturated monomer which has a cationic radical For example, TORIMECHIRU-(2-acrylamide -2, 2-dimethyl ethyl) ammoniumchloride, TORIMECHIRU-(3-acrylamide -3, 3-dimethyl propyl) ammoniumchloride, N-vinyl imidazole, N-vinyl-2-methylimidazole, N-(3-dimethylaminopropyl) methacrylamide, Hydroxyl ethyl trimethylammonium chloride, TORIMECHIRU-(- methacrylamide propyl) ammoniumchloride, N-(1 and 1-dimethyl-3-dimethylaminopropyl) acrylamide, etc. are mentioned.

[0088] 0.1-10-mol% of the ratio of the cation denaturation radical content monomer of cation denaturation polyvinyl alcohol is desirable to vinyl acetate, and is 0.2-5-mol % more preferably.

[0089] The copolymer of the polyvinyl alcohol and JP,61-237681,A which have an anionic radical anion denaturation polyvinyl alcohol is indicated to be by JP,1-206088,A and vinyl alcohol which is indicated by the 63-307979 official report, and the vinyl compound which has a water-soluble radical, and the denaturation polyvinyl alcohol which has a water-soluble radical which is indicated by JP,7-285265,A are mentioned.

[0090] Moreover, the polyvinyl alcohol derivative which added a polyalkylene oxide radical which is indicated by JP,7-9758,A to a part of vinyl alcohol as Nonion denaturation polyvinyl alcohol, for example, the block copolymer of the vinyl compound and vinyl alcohol which have the hydrophobic radical indicated by JP,8-25795,A, etc. are mentioned.

[0091] Although the range of the weight ratio to the hydrophilic binder of the above-mentioned inorganic particle is usually 2-10, especially 3-9 are desirable.

[0092] It is desirable that a way acid or its salt contains as a hardening agent in the ink absorption layer of a record form. As a way acid or its salt, the oxygen acid which uses a boron atom as a neutral atom, and its salt are shown, and an alt.way acid, a meta-way acid, a way [degree] acid, tetraboric acid, 5 way acids, and those salts are specifically contained.

[0093] Although the 2nd ink absorption layer is a layer which forms an opening, void volume is 10-30ml per two 1m of record forms.

[0094] Moreover, the desiccation thickness of the 2nd ink absorption layer is usually 15-45 micrometers.

[0095] Various kinds of additives can be added in the 1st and 2nd ink absorption layers.

[0096] Especially, a cation mordant is desirable in order to improve the water resisting property and moisture resistance after printing.

[0097] Although the polymer mordant which has the class [1st] - 3rd class amino group and a quarternary-ammonium-salt radical as a cation mordant is used preferably, especially the thing for which a cationic non-polymer mordant is used is desirable.

[0098] As a polymer mordant, the polymer mordant which has a quarternary-ammonium-salt radical is desirable from the firmness of weatherability or the dyeing property of a color.

[0099] A desirable polymer mordant is obtained as the homopolymer of the monomer which has the above-mentioned quarternary-ammonium-salt radical, a copolymer with other monomers, or a condensation polymerization object.

[0100] This polymer mordant can be used in any form of the water-dispersion latex particle also as a water-soluble polymer.

[0101] The example of a polymer mordant is given to below.

[0102]

[Formula 1]

[0103]
[Formula 2]

[0104]
[Formula 3]

[0105]
[Formula 4]

[0106]
[Formula 5]

[0107] On the other hand, as a mordant (only henceforth a non-polymer mordant) of cationic non-polymer nature, 12 or more have desirable total of a carbon atomic number, and the compound which has 18 or more quaternary-ammonium-salt radicals more preferably is used.

[0108] The following compounds can be mentioned as an example of the mordant of cationic non-polymer nature.

[0109]
[Formula 6]

[0110] The 0.2-10g per two of the amount of the above-mentioned polymer mordant and the non-polymer mordant used is 0.5-5g preferably 1m of record forms.

[0111] Although it is desirable to make a layer [2nd] ink absorption layer contain at least when especially a cationic mordant is a polymer mordant, it is especially added by both 1st ink absorption layer and 2nd ink absorption layer preferably.

[0112] On the other hand, although the amelioration effectiveness waterproof and damp-proof can be acquired whichever it adds in a layer in order to spread and equalize between layers after spreading, even if it adds to any of the coating liquid which forms the 1st ink absorption layer or the 2nd ink absorption layer when using the mordant of non-polymer nature, it is more desirable to make the 1st and 2nd ink absorption layer contain.

[0113] Moreover, since the 2nd ink absorption layer is opening structure, generally it turns into a hard layer. For this reason, although it is easy to produce a crack at the time of manufacture and evaporation of the ink solvent after ink jet record, in order to mitigate this problem, it is desirable to make the 2nd ink absorption layer at least contain an oil droplet.

[0114] A polymer latex particle 40 degrees C or less is used for the thing and glass transition temperature to which the melting point carried out emulsification distribution of the hydrophobic compound 40 degrees C or less as an oil droplet. As for the particle size of an oil droplet, 0.05-0.5 micrometers of 0.05-0.3-micrometer things are 0.02-1 micrometer usually used especially preferably.

[0115] To the non-subtlety particle which the 2nd ink absorption layer contains, the addition of an oil droplet has 1 - 50 desirable % of the weight at a weight ratio, and is more preferably used at 2 - 20 % of the weight.

[0116] Although this oil droplet can be used not only for the 2nd layer but for the 1st layer, it is desirable to use for the 2nd layer at least from the magnitude of effectiveness.

[0117] In addition to the above, for example, an ultraviolet ray absorbent given in JP,57-74193,A, a 57-87988 official report, and a 62-261476 official report, JP,57-74192,A, a

57-87989 official report, a 60-72785 official report, The fading inhibitor indicated by a 61-146591 official report, JP,1-95091,A, the 3-13376 official report, etc., An anion, a cation or the various surfactants of non-ion, JP,59-42993,A, The fluorescent brightener indicated by a 59-52689 official report, a 62-280069 official report, a 61-242871 official report, JP,4-219266,A, etc., Various well-known additives, such as lubricant, such as a defoaming agent and a diethylene glycol, antiseptics, a thickener, an antistatic agent, and a mat agent, can also be made to contain.

[0118] In order to adhere at the time of piling up immediately after curl prevention or printing to the opposite side and to raise a ** ink imprint further, as for the ink absorptivity side of the ink jet record form of this invention, it is desirable to prepare the back layer of various classes.

[0119] Although the configuration of a back layer changes also with the class of base material, thickness, and the configuration and thickness of an ink absorptivity layer, generally a hydrophilic binder and a hydrophobic binder are used. The range of the thickness of a back layer is usually 0.1-10 micrometers.

[0120] Moreover, it adheres to a back layer as other record forms, and the surface roughening of the front face can be carried out to prevention, note nature amelioration, and a pan for conveyance nature amelioration within an ink jet recording device. The organic or inorganic particle whose particle size is 2-20 micrometers is preferably used for this purpose.

[0121] In case ink jet record is carried out using the ink jet record form of this invention, although there are more amounts of the maximum ink breathed out from an ink nozzle than the void volume which the 2nd ink absorption layer has, this insufficiency is compensated in a swelling operation of the 1st ink absorption layer.

[0122] It is usually 0.3 to 2 times the maximum swelling capacity (this is substantially equal to the ink absorption capacity of the 1st layer) of the 1st ink absorption layer of this preferably 0.1 to 3 times to the void volume of the 2nd layer.

[0123] Next, the manufacture approach of the ink jet record form of this invention is explained.

[0124] Two approaches are adopted as the approach of manufacturing the record form of this invention.

[0125] The 1st approach is the approach of carrying out spreading desiccation of the coating liquid which forms the ink absorption layer which has the 2nd opening layer on the 1st ink absorption layer, after making whenever [dura mater / of the 1st ink absorption layer] five or less for the coating liquid containing the hardening agent which forms the 1st ink absorption layer on a base material after spreading desiccation on a base material.

[0126] The 2nd approach is the approach of applying to coincidence the coating liquid which forms the 1st ink absorption layer on a base material, and the coating liquid which forms the 2nd ink absorption layer which has the 2nd opening layer on a base material.

[0127] In the 1st approach, although the 1st ink absorption layer and the 2nd ink absorption layer are applied separately, after carrying out a dura mater to fixed level after spreading desiccation of the 1st ink absorption layer, it is required to apply the 2nd ink absorption layer.

[0128] In case the coating liquid which forms the 2nd ink absorption layer is applied and it dries, the 1st layer absorbs water and swells moisture from the coating liquid for the

2nd layer. When this swelling of the 1st layer is large, the 2nd layer will lose moisture so quickly and an opening layer will be formed rapidly. Moreover, since the opening layer with the 2nd already hard layer is formed in case the 1st layer contracts in a desiccation process from a swelling condition, the uneven stress by desiccation nonuniformity etc. becomes easy to be applied to the 2nd layer.

[0129] When the dura mater level of the 1st ink absorption layer is inadequate, in case spreading desiccation of the 2nd ink absorption layer is carried out from the above-mentioned reason, it is easy to generate a minute crack and nonuniformity on a front face.

[0130] For this reason, before applying the 2nd ink absorption layer, it is required to make whenever [dura mater / of the 1st ink absorption layer] or less into five, and it is desirable to carry out to three especially or less. The minimum of whenever [dura mater] is 0.5 or more preferably.

[0131] Whenever [dura mater] is measured by the above mentioned approach here.

[0132] There is a method of controlling whenever [dura mater] in the above-mentioned range partly by the class and the desiccation approach of a hardening agent or a hydrophilic binder. For example, the approach of maintaining at a fixed time amount (for example, for [10 seconds -] 10 minutes) elevated-temperature condition (for example, 80-150 degrees C) at the time of the desiccation after spreading, The approach of saving around the 10th on 1 - and carrying out a dura mater by low temperature (for example, 25-50 degrees C) comparatively, after the approach of performing microwave desiccation processing, and desiccation, in the desiccation last process, etc. is mentioned.

[0133] The 2nd approach of the above is the approach of carrying out coincidence spreading of the 1st ink absorption layer and the 2nd ink absorption layer. In this case, in order that the moisture which the 1st ink absorption layer has, and the moisture which the 2nd ink absorption layer has may reduce their weight comparatively equally, there is no nonuniformity in both and the uniform film is formed.

[0134] Even if it is this case, it is required to use a hardening agent from a viewpoint which abolishes the water resisting property of a record form, and the crack after printing.

[0135] Although the extrusion coat method which uses the roll coating method, a rod bar coating method, the air-knife-coating method, a spray coating method, the curtain method of application, or a slide hopper is preferably used as a spreading method of the above-mentioned ink absorption layer, in a multilayer coincidence spreading method, the curtain method of application or a slide hopper spreading method is especially desirable.

[0136] As for the desiccation after spreading, it is desirable whether it once cools and the viscosity of coating liquid is increased and that spray a wind and it is made to dry after making it gel.

[0137] Coating liquid temperature is usually 25-60 degrees C, and is desirable. [of 30-50 degrees C] As for cooling, it is desirable to make it 20 degrees C or less of film surface temperature after spreading become 15-5 degrees C preferably, and, as for subsequent desiccation, it is desirable to spray a 20-60-degree C wind, and to dry from **** which obtains a uniform film surface.

[0138] Although the humid thickness to apply changes by the desiccation thickness made into the purpose, and it is desirable, 70-250 micrometers and a spreading rate are large in desiccation capacity and it depends 50-300 micrometers in general, it is a part for 20-200m/in general. The drying time is 2 - 10 minutes in general.

[0139] Next, when carrying out ink jet record using the record form of this invention, the

water-soluble recording ink in the case of using it is explained below.

[0140] Water-soluble recording ink is usually water soluble dye and a solvent object, and a record liquid that consists of other additives. Although water soluble dye, such as direct dye well-known as water soluble dye at an ink jet, acid dye, basic dye, reactive dye, or a food dye, can be used, direct dye or acid dye is desirable.

[0141] Although it becomes as a subject, when record liquid-liquid dries water, in order that a color may deposit and the solvent of recording ink may prevent the blinding in a nozzle tip or a recording ink supply path, a high-boiling point organic solvent with the boiling point liquefied above 120 degrees C is usually used at a room temperature. A high-boiling point organic solvent needs to have a high miscibility to water, while it is required that it should have vapor pressure far lower than water, since it has the operation which formed elements, such as a color, deposit and prevents generating of a big and rough sludge when water evaporates.

[0142] Although many organic solvents of a high-boiling point are usually used as a high-boiling point organic solvent for such the purpose As an example, ethylene glycol, propylene glycol, a diethylene glycol, Triethylene glycol, a glycerol, the diethylene-glycol monomethyl ether, The diethylene-glycol monobutyl ether, the triethylene glycol monobutyl ether, The glycerol monomethyl ether, 1 and 2, 3-butane triol, 1 and 2, 4-butane triol, Alcohols, such as 1, 2, 4-pentanetriol, 1 and 2, 6-hexane triol, 1, 2-hexandiol, thiodiglycol, triethanolamine, and a polyethylene glycol (average molecular weight is about 300 or less), are mentioned. Moreover, dimethylformamide, N-methyl pyrrolidone, etc. can be used also besides having described above.

[0143] Also in the high-boiling point organic solvent of these many, the low-grade alkyl ether of the polyhydric alcohol of polyhydric alcohol, such as a diethylene glycol, triethanolamine, and a glycerol, and the triethylene glycol monobutyl ether etc. is desirable.

[0144] As an additive of others which recording ink contains, a pH regulator, a sequestering agent, an antifungal agent, a viscosity controlling agent, a surface tension regulator, a wetting agent, a surfactant, a rust-proofer, etc. are mentioned, for example.

[0145] In order that the wettability to a record form may make it good, it is the purpose which stabilizes the regurgitation from an ink jet nozzle, in 25 degrees C, 25 - 50 dyne/cm of recording ink is desirable, and it is desirable to have the surface tension of 28 - 40 dyne/cm within the limits more preferably.

[0146] Moreover, in 25 degrees C, the viscosity of recording ink has desirable 2 - 10cp, and is usually 2.5 - 8cp more preferably. Moreover, since the diameter of the minimum dot with a diameter of 20-60 micrometers is obtained on a record form as a minimum liquid ink drop by which 3-9 are breathed out from a desirable ink nozzle in the case of the capacity of 1-30pl, pH of recording ink is desirable. The color-print printed with such a diameter of a dot gives a high-definition image. It is the case where the drop which has the volume of 2-20pl preferably is breathed out as the minimum drop.

[0147] Moreover, in the method recorded about a Magenta and cyanogen at least in the ink whose concentration is two kinds from which said water color ink differs more than twice respectively, since low-concentration ink is used, it is hard coming to carry out discernment of a dot in the highlights section, but this invention can be applied, also when this recording method is adopted.

[0148] In the ink jet record approach, as the record approach, various kinds of well-

known methods can be used conventionally, and the detail is indicated by the trend (the volume for Koichi Nakamura, March 31, Heisei 7, the Japan science-information incorporated company issue) of for example, an ink jet record technique.

[0149]

[Example] Although the example of this invention is given and explained below, this invention is not limited to these examples.

[0150] The paper base material which covered both sides of the stencil paper for photographs of example 1170 g/m² with polyethylene (an anatase mold titanium dioxide is contained 13% of the weight in a polyethylene layer with a thickness [by the side of a recording surface] of 35 micrometers.) the back layer which the thickness of the polyethylene layer by the side of a rear face makes solid content Tg=65 degree C acrylic latex resin on a polyethylene layer by 25 micrometers, and is contained two times 0.3 g/m by making into a mat agent the silica 0.6 g/m² and whose mean diameter are about 13 micrometers -- having -- it prepared.

[0151] Next, the coating liquid of the following presentations was prepared (all show in the amount of per coating liquid 1L).

[0152]

[Coating liquid -1]

Acid-treatment gelatin (isoelectric point = 7.8) 42g Saponin (5% water solution) 25ml DIDP dispersion liquid (1) 40ml Titanium oxide dispersion liquid (2) 40ml [coating liquid -2]

Particle silica dispersion liquid (3) 450ml (the Japanese Aerosil Industries make A200) A cationic polymer (4) 2g Ethanol 35ml n-propanol 10ml Ethyl acetate 5ml Polyvinyl alcohol 0.1g (PVA203 by Kuraray Co., Ltd.)

Polyvinyl alcohol 12g (PVA235 by Kuraray Co., Ltd.)

A boric acid 2.0g Way sand 1.0g DIDP dispersion liquid (1) : [Di-isodecyl phthalate (3g) and a fluorescent brightener -1]. The heating dissolution of (the 0.15g) is carried out at 8ml of ethyl acetate. **** Water solution 2 which contains 8% and a saponin for ** gelatin 2% Pure [to 40ml] in the whole quantity, after mixing to 0ml and carrying out emulsification distribution It finishes with water.

[0153] Titanium oxide (2): After adding 12g of KR310 by Titan Kogyo K.K. 30ml of pure water and distributing for 5 minutes by 10,000 rotations using a high-speed homogenizer, 40ml was made to the whole quantity with pure water.

[0154] Particle silica (3): Make 450ml to the whole quantity with pure water after adding 80g A300 by Japanese Aerosil Industries in 400ml of pure water and distributing by the emulsification disperser.

[0155] Humid thickness instantiation mordant Mor-9[coating liquid-1] by 60 micrometers on the above-mentioned base material at 40 degrees C Cationic polymer (4) : After spreading, It cools quickly within 20 seconds so that coat temperature may become 15 degrees C or less. Subsequently a 25-degree C wind For 30 seconds, 40-degree-C wind was sprayed for the 30-degree C wind for 30 seconds, for 30 seconds and a 35 more-degree C wind were sprayed for 30 seconds and for a 45-degree C wind one by one for 30 seconds, and it dried, and it was made to pass for 90 seconds and gas conditioning of 25 more degrees C and the ambient atmosphere of 50% of relative humidity was carried out.

[0156] Next, on this, as [coating liquid -2] humid thickness was set to 150 micrometers, it

applied. It cooled quickly within 30 seconds so that, as for desiccation conditions, coat temperature might become 15 degrees C or less, and subsequently, the wind (for 60 seconds and 40 degrees C) was sprayed for the 35-degree C wind, the wind (for 60 seconds and 40 more degrees C) was sprayed for for [60 seconds] and 45-degree-C wind one by one for 30 seconds, it dried, the ambient atmosphere of 25 more degrees C and 50% of relative humidity was passed for 120 seconds, gas conditioning was carried out, and the record form -1 was created.

[0157] On the other hand, it sets in the record form -1, and is 2-hydroxy as a hardening agent to [coating liquid -1]. - The record form -2 as well as the record form -1 was created except having added 40mg per gelatin 1g of 1 and 3-bisvinyl sulfonyl propanes. Furthermore, in the record form -2, after saving [coating liquid -1] for three days at 35 degrees C after spreading desiccation, [coating liquid -2] was applied like the record form -1, and the record form -3 was obtained.

[0158] Furthermore, the record form -4 which applied [coating liquid -1] as a comparison sample besides this invention so that humid thickness might be set to 120 micrometers and the record form with which it applied [coating liquid -2] to them as humid thickness was set to 150 micrometers and 250 micrometers - 5 and 6 were created.

[0159] Record form - Each of 1-6 was saved for five days at 35 degrees C after spreading.

[0160] Record form - In 1, 2, and 3, whenever [dura mater / of the coat before applying [coating liquid -2]] was as follows.

[0161] Record form -1: The measurement which a coat dissolves underwater and is whenever [dura mater] is impossible.

[0162] The following items were evaluated about the record form-2:4.3 record form - 3:1.2, next each obtained record form.

[0163] ** crack [after spreading]: -- ** ink absorption capacity which investigated the number of cracks per two 100cm : canon incorporated company make -- the maximum ink discharge quantity with which ink does not overflow on a record form was calculated as an ink absorption capacity, changing the amount of ink by ink jet printer BJC-420 (cc/m2)

** Ink rate of absorption : The reflection density of 50 points of arbitration was measured for the part which carried out solid printing at homogeneity by the microdensitometer so that the reflection density of blue and red might be set to about 1.5 in green with the above-mentioned ink jet printer, and the standard deviation was broken by average reflection density. The red of this value and the blue average were made into the standard of ink rate of absorption. The crack after ** printing with quick forge-fire ink rate of absorption with this small value: 24 hours after carrying out solid printing with the on-demand mold ink jet printer, the time amount [lays the regular paper after printing on top of the ** drying:** sample which investigated the ** glossiness:75 degree specular gloss which observed visually and investigated the number of cracks per two 100cm, and / ink] no longer imprinting was found as drying.

[0164] The obtained result is shown in Table 1.

[0165]

[Table 1]

[0166] Record form which prepared the swelling layer in the lower layer of an opening layer from the result shown in Table 1 - 1-3 are understood that there is more absorption capacity than the record form -6 which applied [coating liquid -2] by 250 micrometers of humid thickness.

[0167] However, there are many cracks after spreading and the record form -1 of glossiness is low.

[0168] In the record form -2 which added the hardening agent to [coating liquid -1], the crack is improved greatly. before the thing especially with few cracks adding a hardening agent to [coating liquid -1] and applying [coating liquid -2] -- warming -- it is the record form in which it processed and whenever [dura mater] was reduced.

[0169] Although the glossiness of the record form -4 which applied [coating liquid -1] is expensive, ink rate of absorption is low.

[0170] Although the ink rate of absorption of the record form -5 which applied [coating liquid -2] is high, when ink absorption capacity is especially inadequate and applies by 250 micrometers, although ink absorption capacity increases, a crack increases it.

[0171] In the record form -3 created in the example -2 example -1, the record form -7 as well as a record form was created in [coating liquid -2] except having added coating liquid 1L per 40ml of DIDP dispersion liquid used for [coating liquid -1].

[0172] A result is shown in Table 2.

[0173]

[Table 2]

[0174] It turns out that a crack can be improved nearly completely, without degrading most rate of absorption, absorption capacity glossiness, and drying one by making an oil droplet contain in an opening layer from the result of Table 2.

[0175] It is a record form as well as the record form -3 except having changed the hardening agent into the diglycidyl propane, and having changed the addition in the record form -3 created in the example -3 example -1, as shown in Table 3 per gelatin 1g. - 11-13 were created.

[0176] Whenever [dura mater / after saving for three days after applying the 1st ink absorption layer at 35 degrees C] was shown in Table 3.

[0177]

[Table 3]

[0178] The result which performs the same evaluation as an example -1, and shows each above-mentioned record form in Table 4 was obtained.

[0179]

[Table 4]

[0180] The record form -11 with whenever [dura mater / of the result of Table 4 to 1st ink absorption layer / low] is the record sample to which whenever [dura mater] became five or less by increase in quantity of a hardening agent although there were many cracks after spreading. - It turns out that there are few cracks and 122 and 13 have attained high ink rate of absorption and high ink absorption capacity.

[0181] In the record form -3 created in the example -4 example -1, 2.5g per two of tetradecyl ammoniumchloride was added 1m of record forms as a cationic mordant to [coating liquid -1], the record form -15 which removed the cationic polymer mordant (4) from [coating liquid -2] was created like the record form -3, and the result which estimates as an example -1 similarly and is shown in Table 5 was obtained.

[0182]

[Table 5]

[0183] Even if it changes a mordant, there are few cracks like the record form -3, and it turns out that high ink absorptivity and high ink absorption capacity are attained.

[0184] Record form which applied [coating liquid -1] and [coating liquid -2] by the approach of carrying out coincidence spreading in the record form -7 created in the record form -3 and example -2 which were created in the example -5 example -1 - 3A and 7A were created. The result which estimates as an example -1 similarly and is shown in Table 6 was obtained.

[0185]

[Table 6]

[0186] The result of Table 6 shows that the record form of high ink rate of absorption with few cracks and high ink absorption capacity is obtained like an example 1 even if it applies the 1st ink absorption layer and the 2nd ink absorption layer.

[0187]

[Effect of the Invention] The manufacture approach of the ink jet record form by this invention and this record form has the ink absorption layer which increased ink absorption capacity on a base material, without increasing thickness unnecessarily, with high ink rate of absorption held, and has a high water resisting property and high moisture resistance, and has the outstanding effectiveness.